

Completing the Square

⑤ expand $(x+3)^2$

x	$+3$	
x^2	$3x$	x
$3x$	9	$+3$

$$= x^2 + 6x + 9$$

(M1)

so $x^2 + 6x + 9$ factorises into the perfect square $(x + 3)^2$

Factorise these perfect squares

a $x^2 + 8x + 16 = (x + 4)^2$

b $x^2 + 10x + 25 = (x + 5)^2$

c $x^2 + 14x + 49 = (x + 7)^2$

d $x^2 + 16x + 64 = (x + 8)^2$

Q12 Explain why

$$x^2 + 22x + 100 \text{ is not able to be}$$

factorised into a perfect

square.

$$The\ 22 \Rightarrow (x+11)^2 \quad The\ 100 \Rightarrow (x+10)^2 \quad (\text{not equal})$$

Q13 How could we change $x^2 + 22x + 100$ so that it could be written as a perfect square

Q14 idea 1: $x^2 + 22x + \underline{121}$

Q15 idea 2: $x^2 + 20x + \underline{100}$

(14)

Turning

$$x^2 + 22x + 100$$

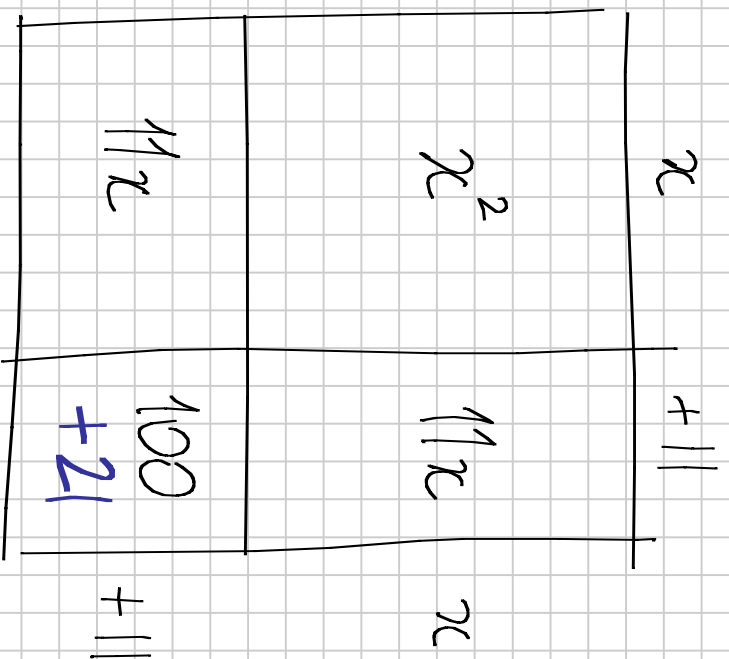
into $x^2 + 22x + 121$

by adding 21 is said to be completing the square

We could write

$$x^2 + 22x + 100 + 21 = (x + 11)^2$$

Notice how this looks in the grid



M5 Since

$$x^2 + 22x + 100 + 21 = (x+11)^2$$

We also know

$$x^2 + 22x + 100 = (x+11)^2 - 21$$

This is writing $x^2 + 22x + 100$ in completed square form

M6

Write $x^2 - 6x + 9$ as a perfect square

$$x^2 - 6x + 9 = (x - 3)^2$$

Use this to write

$x^2 - 6x + 4$ in completed square form

$$(x - 3)^2 - 5$$

(17)

Ex 2C

$$1 \quad x^2 + 4x$$

$$= (x+2)^2 - 4$$

$$2 \quad x^2 - 6x$$

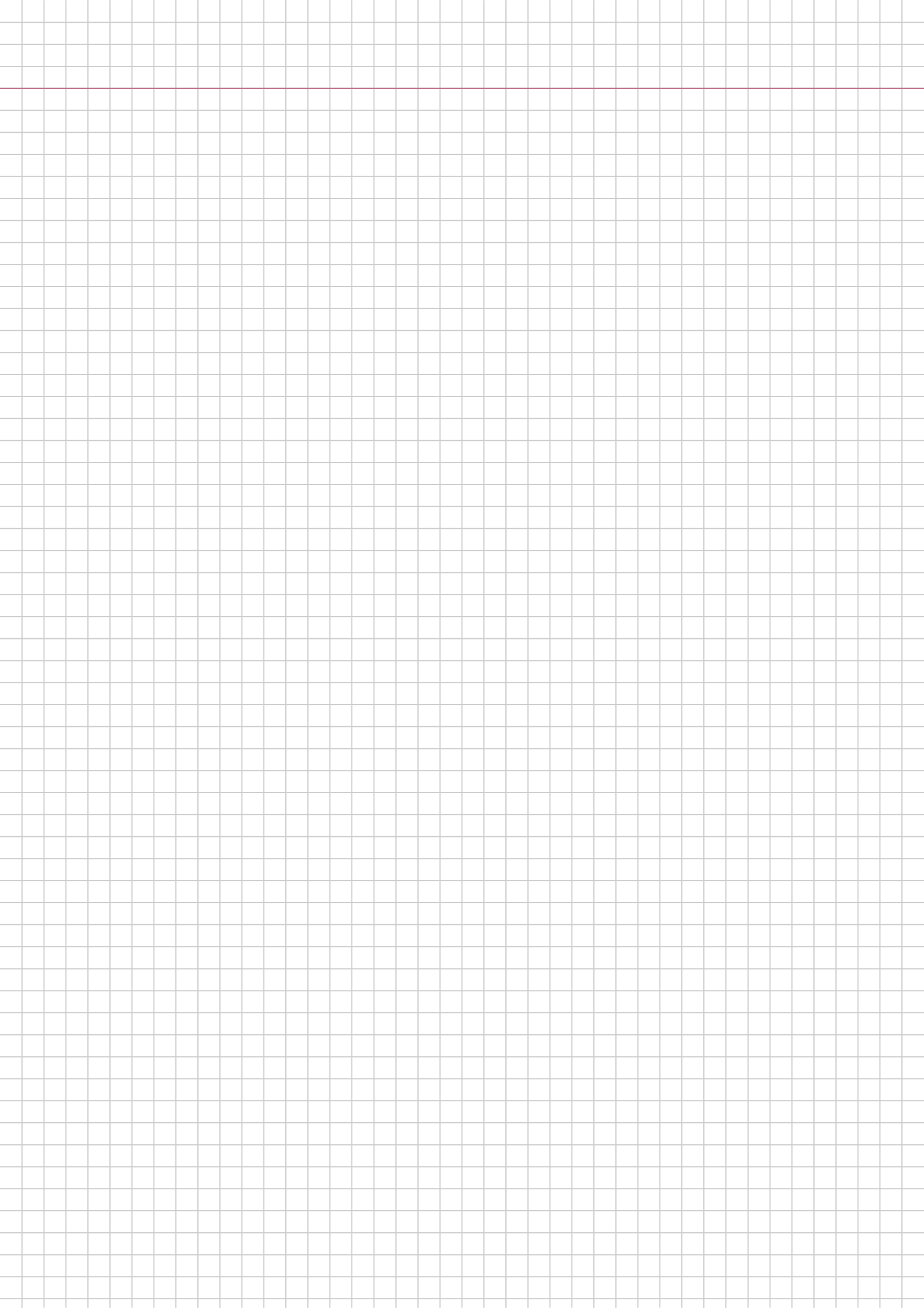
$$3 \quad x^2 - 16x = (x-8)^2 - 64$$

$$4 \quad x^2 + x = \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$

5

$$6 \quad 2x^2 + 16x$$

$$= 2[x^2 + 8x] = 2[(x+4)^2 - 16]$$



M8

Ex 2D

$$x^2 + 6x + 1 = 0$$

$$(x+3)^2 - 8 = 0$$

$$(x+3)^2 = 8$$

$$x+3 = \pm\sqrt{8}$$

$$x = -3 \pm \sqrt{8}$$

$$x = -3 \pm 2\sqrt{2}$$

